Technical method description

The Rotating Fatigue test (Hippo) is developed at MDT A/S to characterize material properties such as dynamic failure within fast response time. The method simulates similar behavior of a cantilever beam where forces can be loaded at the tip of a specimen which can be used to characterize the bending stresses and fatigue failure of a sample. The method can also be used to indicate if selected fasters (e.g. screws, bolts, glue, and tape) are suitable for certain applications where cyclic fatigue is predominant occurrence. The test setup is illustrated in **Error! Reference source not found.**, demonstration the rotation of a sample S1) which experience both gravitational force and centrifugal pseudo force when the panel is set in rotation. The displacement and rotational speed can be adjusted according to desired area of interest.

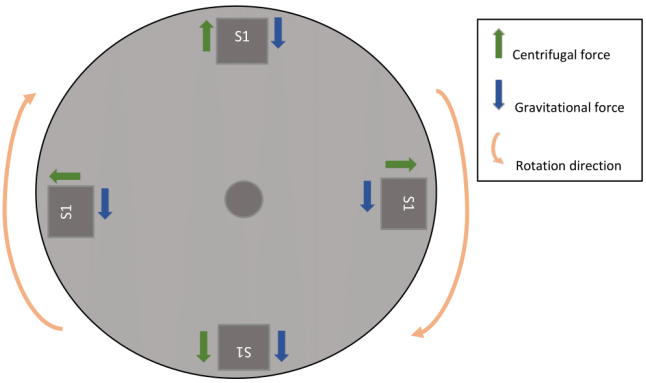

Figure 1: Schematic illustration of the Rotating Fatigue test.

The two forces can be either combined or equalized with each other giving raise to three important programs as shown in Figure 3. Varying Wave function is the first program which aids in characterization of a specimen the load is two sided creating an equal force on both side due to the gravitational force. Sin Wave function is the second program allowing the specimen to have a one-sided load due to the increased influence of the centrifugal force. While the third program Shifted Sin Wave function the load is increasingly dominated by the centrifugal forces which influence one side significantly more than the other. The exertion of both maximum and minimum force $(\sigma_{max}\ \&\ \sigma_{min})$ occur once every cycle and, thus creating a continuous load on the specimen.

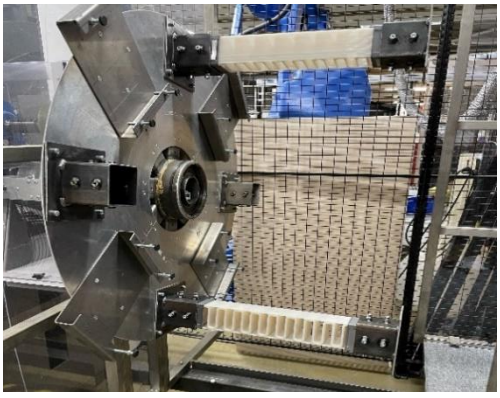

Figure 2: Setup of hippo test with Inlay as test specimen.

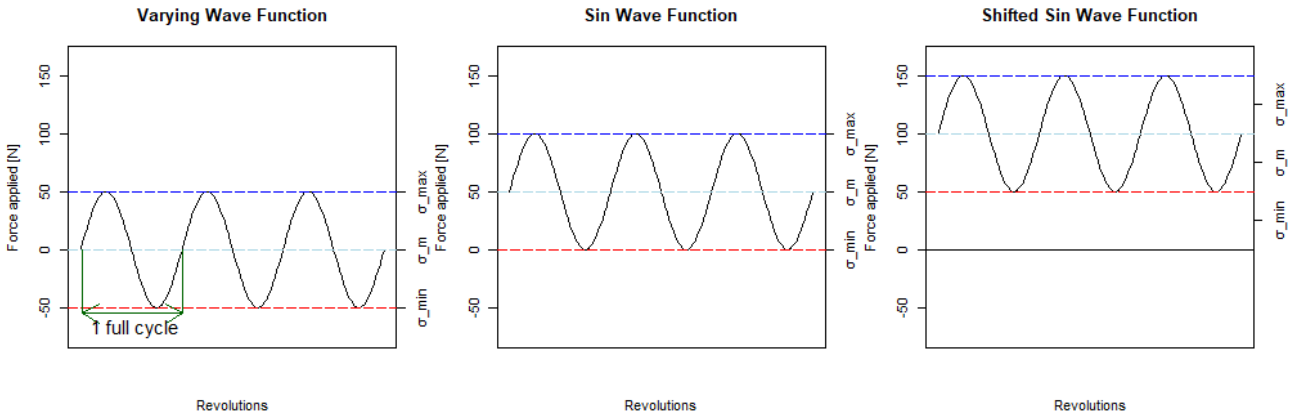

Figure 3: Illustration of three method which can be achieved by the Rotating Fatigue test.

This method can be utilized for multiple reasons such as analyzing the dynamic fatigue of car antennas, wind turbine blades, support materials and solar panels etc. The setup allows for the analysis of specimen with dimensions up to 110 cm in length and 40 cm in width depending on the specimens structure. Furthermore, it's possible to increase the load at the free end which is configurated according to the specimen's real-life application.